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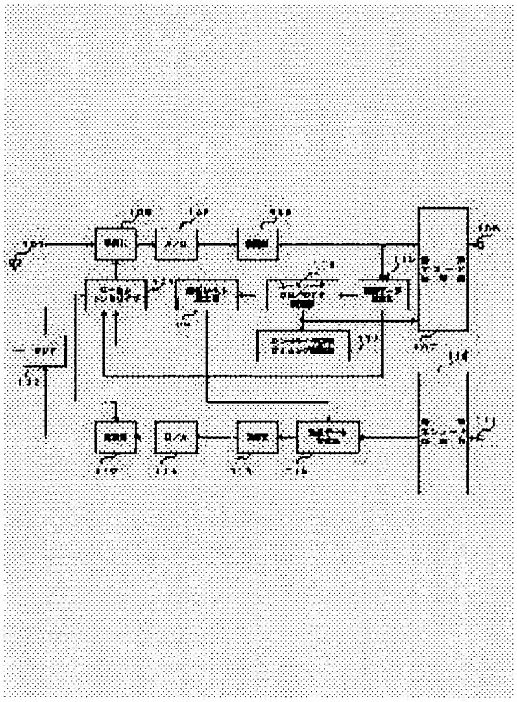
(54) DATA COMMUNICATION SYSTEM AND EQUIPMENT USED FOR IT

(57)Abstract:

PROBLEM TO BE SOLVED: To monitor a reception level of a peripheral base station during data communication without incurring an increase of a control load of a base station even when user data such as voice to be communicated are continuously in existence.

SOLUTION: A control data detection part 110 of a mobile station equipment detects user data ON/OFF information sent from a base station equipment and a user data ON/OFF discrimination part 118 judges the detected result. In the case that the user data are OFF, a synthesizer timing control part 117 and a local synthesizer 104 change a reception frequency to a frequency of a peripheral base station based on peripheral base station frequency data detected from an outgoing signal by the control data detection part 110, and a reception level measurement part 109 monitors the reception level of the peripheral base station and transmits it to the base station equipment.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the data telecommunication system with which a communication link is performed continuously, as long as user data, such as voice which should communicate especially, exist about the data telecommunication system used for digital mobile communication.
[0002]
[Description of the Prior Art] Conventionally, the data communication unit used for this kind of data telecommunication system is constituted as shown in drawing 17 . Drawing 17 shows the example of 1 configuration of the data communication unit in the mobile station equipment for TDMA digital mobile communication.
[0003] An antenna 1 is an antenna of transceiver common use, is time sharing and, as for the antenna switch 2, switches an antenna 1 to a transmitting side and a receiving side. A receive section 3 is the received frequency set up by the local synthesizer 4, and does frequency conversion of the receiving RF signal to IF or baseband. The local synthesizer 4 is generated according to the frequency data which detected the local signal for reception inputted into a receive section 3, and the local signal for transmission inputted into the transmitting section 16 mentioned later from the input signal in the control data detecting element 10 mentioned later.
[0004] The A/D-conversion section 5 is a circuit which carries out A/D conversion of the input signal, and the recovery section 6 is a circuit which performs recovery processing of a synchronous detection, differentially coherent detection, etc. to receiving timing to a burst input signal, and outputs decode data.

[0005] It is digitized in the A/D-conversion section 5, and gets over in the recovery section 6, detection and decode of voice data are performed in the voice decoding section 7, and the input signal changed into baseband signaling or an IF signal in the receive section 3 is outputted from a terminal 8.
[0006] Moreover, the receiving level test section 9 is a circuit which measures the receiving level of an input signal, and the control data detecting element 10 is a circuit which detects the control data containing the frequency data of a communication channel, the frequency data of a circumference base station, etc. from the reception recovery data which are the output of the recovery section 6.
[0007] On the other hand, the voice data inputted from a terminal 11 is encoded in the voice encoding processing section 12. The transmit data composition section 13 is a circuit which compounds transmission-control data, such as this encoded transmitting voice data and output data of the receiving level test section 9, and generates transmitting burst data. The modulation section 14 is a circuit where ** and D/A converter 15 analog-ize a modulating signal in the circuit which modulates QPSK etc. to transmitting burst data. The transmitting section 16 is the local signal for transmission outputted from the local synthesizer 4, and is baseband or a circuit which carries out frequency conversion of the modulating signal of IF to a transmitting RF signal.
[0008] Although the local synthesizer 4 also generates the dispatch frequency for monitors which carries out the monitor of the receiving level from a circumference base station other than the dispatch frequency for reception, and the dispatch frequency for transmission, the change of the frequency is controlled by the change-over timing control section 17.
[0009] With the data communication unit constituted as mentioned above, it explains along the timing chart showing the actuation in the case of communicating data in drawing 18 , moving.
[0010] It gets down, and a communication link frame goes up with the receiving slot (RX) of a signal

(a), is constituted by the transmitting slot (TX) of a signal (b), and measures the receiving level of a circumference base station in the empty slot of each frame so that it may illustrate. For example, it gets down, and in the receiving timing of a signal (a), a migration machine performs receiving level measurement of a local station, and in the empty slot of a frame 1, the receiving level of the circumference base station of a carrier frequency f2 is measured, and it measures respectively the receiving level of the circumference base station of a carrier frequency f3 by the empty slot of a frame 2.

[0011] The measurement result of these local station receiving level and the receiving level of a circumference base station is the transmit data composition section 13, is included in transmitting burst data as uphill control data, and is transmitted to the base station under current connection. In the base station side which received the measurement result of the receiving level, the local station receiving level and circumference base station receiving level which were notified from the mobile station are compared, and handover control is performed.

[0012] Thus, in the conventional TDMA data communication unit, since it has composition which notifies the measurement result of local station receiving level and circumference base station receiving level to the base station under connection from a mobile station, as compared with the conventional analog cellular phone in which a mobile station does not have the function which carries out the monitor of the receiving level of a circumference base station, the burden of the handover control by the base station side will be mitigated.

[0013] And in a mobile station side, since it has composition which carries out the monitor of the receiving level of a circumference base station using the empty slot prepared in time sharing apart from the data communication slot in the frame as mentioned above, a mobile station can carry out the monitor of the receiving level of both a local station and a circumference base station with one receiving set.

[0014]

[Problem(s) to be Solved by the Invention] However, there is un-arranging [which the case where the monitor of the receiving level of a circumference base station cannot be performed for a long time generates, for example since in the case of the communication mode in which user data, such as voice which should not take time-division system like a CDMA communication mode, but should communicate, exist continuously the communication link of data is also performed continuously and an empty slot will not exist].

[0015] On the other hand, although the configuration which adds the communications department for the reception measurement for circumference base stations is also considered apart from the receiving set for local stations, now, there is a problem of causing increase of the hardware scale of a mobile station.

[0016] This invention aims at offering the equipment used for the data telecommunication system and this which can perform the monitor of the receiving level of a circumference base station to data communication Naka, without causing increase of the control burden of a base station, even if it is the case where user data, such as voice which is made in view of the above-mentioned technical problem, and should communicate, exist continuously.

[0017]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, this invention takes the following configurations.

[0018] In invention according to claim 1, base station equipment transmitted continuously the sending signal of the frame structure which consists of two or more slots containing a control data field and a user data field, and mobile station equipment was considered as the configuration which carries out the monitor of the receiving level of the signal transmitted to the silent section when the user data in said sending signal which received do not exist from other circumference base station equipments while it received said sending signal. Handover control can be performed without affecting a message and data communication, since the monitor of the receiving level of a circumference base station can be carried out to the time zone when user data do not exist by this configuration.

[0019] Mobile station equipment can be notified [like invention according to claim 2 in whether it is the field where user data do not exist] to a mobile station from a base station by considering as the configuration which performs the monitor of the receiving level of circumference base station equipment according to said user data ON/OFF information by transmitting by base station equipment inserting the user data ON/OFF information which notifies the existence of user data to a sending signal.

[0020] There are the following approaches about what kind of timing performs the monitor of the receiving level of a circumference base station by which slot. First, in the frame which performs the monitor of the receiving level of circumference base station equipment, mobile station equipment switched received frequency to the received frequency of object circumference base station equipment for every slot, and invention according to claim 3 considered it as the configuration which performs the monitor of the receiving level of two or more circumference base station equipments one by one. According to this configuration, the monitor of the receiving level of two or more circumference base stations by one frame can be performed.

[0021] Moreover, invention according to claim 4 considered mobile station equipment as the configuration which switches received frequency to the received frequency of object circumference base station equipment, carries out two or more slot continuation, and performs the monitor of the receiving level of said object circumference base station equipment in the frame which performs the monitor of the receiving level of circumference base station equipment. According to this configuration, the received frequency of a specific circumference base station is detectable with a sufficient precision.

[0022] Moreover, what is necessary is just to consider mobile station equipment as the configuration which judges the receiving level of said circumference base station equipment like invention according to claim 5 in these configurations, with the average value of the monitor result of the receiving level of the multiple times which followed the circumference base station equipment of 1, in order to raise the detection precision of receiving level further.

[0023] While base station equipment transmits continuously the sending signal of the frame structure which consists of two or more slots containing a control data field and a user data field in invention according to claim 6 and mobile station equipment receives said sending signal When the receiving level of said sending signal which received became under a predetermined threshold, it considered as the configuration which carries out the monitor of the receiving level of the signal which interrupts the communication link with said base station equipment under communication link temporarily, and is transmitted from other circumference base station equipments.

[0024] It becomes unnecessary to transmit information to show the existence of user data from base station equipment to mobile station equipment by this configuration, and mobile station equipment can perform a handover quickly and easily by starting the monitor of the receiving level of a circumference base station, when the receiving level from the base station equipment under communication link falls.

[0025] In this case, what is necessary is just to consider mobile station equipment as the configuration which carries out the monitor of the receiving level of the signal transmitted from other circumference base station equipments only by some slots in one frame like invention according to claim 7 about in which part of a receiving frame the monitor of receiving level is performed. Like invention according to claim 8, specifically mobile station equipment The comparison with the receiving level of a sending signal and the predetermined threshold which were received from the base station equipment under communication link in slots other than the slot which carries out the monitor of the receiving level of the signal transmitted from other circumference base station equipments in one frame is performed. When said receiving level became said under predetermined threshold, it considered as the configuration which carries out the monitor of the receiving level of the signal transmitted from other circumference base station equipments also in the frame which follows. It becomes possible [the communications control according to an electric-wave condition] for becoming possible, since measurement of the receiving level of the signal from the office under communication link is continuable in other slots of one frame to continue a monitor and to perform a handover, in being in the condition to which the receiving level fell, stopping a monitor and continuing a communication link by these configurations, when the receiving level increases conversely etc.

[0026] There are the following approaches about what kind of timing performs the monitor of the receiving level of a circumference base station by which slot. Like invention according to claim 9, mobile station equipment How to consider as the configuration which switches received frequency to the received frequency of object circumference base station equipment for every slot, and performs the monitor of the receiving level of two or more circumference base station equipments one by one in the frame which performs the monitor of the receiving level of circumference base station equipment, Like invention according to claim 10, mobile station equipment In the frame which performs the monitor of the receiving level of circumference base station equipment, there is the approach of considering as the configuration which switches received frequency to the received frequency of object circumference base station equipment, carries out two or more slot continuation, and performs the monitor of the receiving level of said object circumference base station equipment.

[0027] What is necessary is just to consider mobile station equipment as the configuration which judges the receiving level of said circumference base station equipment like invention according to claim 11 with the average value of the monitor result of the receiving level of the multiple times which followed the circumference base station equipment of 1, in order to raise the detection precision of receiving level in these cases.

[0028] Moreover, invention according to claim 12 considered mobile station equipment as the configuration which does not perform the monitor of the receiving level of circumference base station equipment continuously more than a predetermined frame. It can prevent that a receiving frame is missing and received data deteriorate with the receiving level monitor of a circumference base station by this.

[0029] Furthermore, invention according to claim 13 considered the data of the frame which was not able to be received when mobile station equipment carried out the monitor of the receiving level of the signal transmitted from other circumference base station equipments as the configuration which carries out interpolation processing using the data of the already received frame. Since the data of the missing frame are reproduced in false by this configuration, by it, degradation of received data becomes extent which is satisfactory practically. The approach of repeating simply in the case of voice data may be used for this interpolation processing.

[0030] Invention according to claim 14 is invention of a data telecommunication system. Base station equipment While the sending signal of the frame structure which consists of a control data field including the user data ON/OFF information which notifies the existence of user data, and a user data field is transmitted continuously and mobile station equipment receives said sending signal According to said user data ON/OFF information, the monitor of the receiving level of the signal transmitted to the silent section when the user data in said sending signal which received do not exist from other circumference base station equipments is carried out. And when the receiving level of said sending signal which received became under a predetermined threshold, it considered as the configuration which carries out the monitor of the receiving level of the signal which interrupts the communication link with said base station equipment under communication link temporarily, and is transmitted from other circumference base station equipments. By this configuration, in order that a mobile station may start the monitor of the receiving level of a circumference base station with the both sides of user data ON/OFF information and a fall of the receiving level of a sending signal, its opportunity to perform a monitor increases and its monitor precision improves.

[0031] Invention according to claim 15 is set to a data telecommunication system according to claim 1 to 14. Moreover, base station equipment It transmits by inserting the indication signal which directs the monitor of the receiving level of the signal transmitted to the control data field of a sending signal from other circumference base station equipments to mobile station equipment. Mobile station equipment When there were no monitor directions by said indication signal, it considered as the configuration which makes an OFF condition a part of the receiving functional division [at least]. Since performing the monitor of the receiving level of a circumference base station is lost by this configuration when there is no need, reduction of the power consumption of mobile station equipment can be aimed at.

[0032] Moreover, invention according to claim 16 offers the base station equipment used for a data telecommunication system according to claim 1 to 15, and invention according to claim 17 offers the mobile station equipment used for a data telecommunication system according to claim 1 to 15.

[0033] Invention according to claim 18 is invention of the data communication approach. Moreover, base station equipment While the sending signal of the frame structure which consists of a control data field including the user data ON/OFF information which notifies the existence of user data, and a user data field is transmitted continuously and mobile station equipment receives said sending signal [whether according to said user data ON/OFF information, the monitor of the receiving level of the signal transmitted to the silent section when the user data in said sending signal which received do not exist from other circumference base station equipments is carried out, and] Or when the receiving level of said sending signal which received became under a predetermined threshold, it considered as whether the monitor of the receiving level of the signal which interrupts the communication link with said base station equipment under communication link temporarily, and is transmitted from other circumference base station equipments is carried out, and the configuration which performs whether it is ********. By this configuration, like invention according to claim 14, in order that a mobile station may start the monitor of the receiving level of a circumference base station with the both sides of user data ON/OFF information and a fall of the receiving level of a sending signal, its opportunity to perform a monitor increases and its monitor precision improves.

[0034] Claim 19 is invention of the data receiving approach. Moreover, from base station equipment After receiving the sending signal continuously transmitted with the frame structure which consists of a control data field including the user data ON/OFF information which notifies the existence of user data, and a user data field, [whether according to said user data ON/OFF information, the monitor of the receiving level of the signal transmitted to the silent section when the user data in said sending signal which received do not exist from other circumference base station equipments is carried out, and] Or when the receiving level of said sending signal which received became under a predetermined threshold, it considered as whether the monitor of the receiving level of the signal which interrupts the communication link with said base station equipment under communication link temporarily, and is transmitted from other circumference base station equipments is carried out, and the configuration which performs whether it is ********. Invention according to claim 20 considered the data of the frame which was not able to be received by carrying out the monitor of the receiving level of the signal transmitted from other circumference base station equipments in the data receiving approach according to claim 19 as the configuration which carries out interpolation processing using the data of the already received frame. The mobile station equipment used with the above-mentioned data telecommunication system should just perform the monitor of reception of data, and the receiving level of a circumference base station by such approach.

[0035] Moreover, what is necessary is just to consider base station equipment as the configuration which inserts user data ON/OFF information in a part of transmitting frame, and transmits data like invention according to claim 21, in order to make the monitor of the receiving level of a circumference base station perform to mobile station equipment.

[0036] Invention according to claim 22 is invention of the data communication approach. Moreover, mobile station equipment When the receiving level of the sending signal from base station equipment becomes under a predetermined threshold, a notice signal to that effect is transmitted to said base station equipment. Said base station equipment The indication signal which directs the monitor of the receiving level of circumference base station equipment to said mobile station equipment when said notice signal is received was transmitted, and when said indication signal was received, said mobile station equipment was considered as the configuration which notifies a monitor result to base station equipment, after it performed said monitor. Moreover, as for base station equipment, invention according to claim 23 transmits the monitor result of a circumference base station to control station equipment from mobile station equipment in the data communication approach according to claim 22, and control station equipment was made to perform handover control according to said received monitor result. Even when the receiving level of the sending signal from base station equipment becomes under a predetermined threshold unlike invention explained before it, these invention does not perform the monitor of the receiving level of a circumference base station as it is, but waits for the directions from the base station equipment under communication link, and starts a monitor. By judging a monitor initiation stage with base station equipment, the necessity of handover control etc. can perform the directions to a mobile station with base station equipment in consideration of other elements. And claim 24 and claim 25 are invention of mobile station equipment and base station equipment respectively used for the data communication approach according to claim 22 or 23.

[0037]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained using a drawing.

[0038] (Gestalt 1 of operation) The data telecommunication system concerning the gestalt 1 of operation of this invention is first explained concretely using a drawing. Drawing 1 is the block diagram showing the configuration of the data communication unit used for the data telecommunication system concerning the gestalt 1 of operation of this invention, and drawing 2 is the receiving timing chart of the input signal from the office for a communication link and circumference base station of a gestalt 1 of operation.

[0039] An antenna 101 is an antenna of transceiver common use, and the transceiver splitter 102 performs spectral separation for oppressing interference between a sending signal and an input signal on the occasion of simultaneous transmission and reception. A receive section 103 is the local signal for reception inputted from the local synthesizer 104, and does frequency conversion of the receiving RF signal to IF or baseband. The local synthesizer 104 is generated according to the frequency data which detected the local signal for reception inputted into a receive section 103, and the local signal for transmission inputted into the transmitting section 116 from the input signal in the control data detecting element 110 mentioned later.

[0040] The A/D-conversion section 105 is a circuit which carries out A/D conversion of the input signal, and in the recovery section's 106 performing back-diffusion-of-electrons processing, recovery processing, and data judging processing when applying to a CDMA system, and applying to alien systems, such as FDMA, recovery processing and data judging processing are performed and it outputs the recovery signal which it is as a result of recovery processing, and the decode data which it is as a result of a data judging.

[0041] The voice decoding section 107 inputs the decode data which are the output of the recovery section 106, performs detection and voice decode of voice data, and outputs it from a terminal 108.

[0042] The receiving level test section 109 is a circuit which inputs the recovery signal of the recovery section 106 and measures the receiving level of an input signal.

[0043] The control data detecting element 110 is a detecting element which detects control data including the user data ON/OFF information which shows the existence of user data, such as voice which is the output of the recovery section 106, and which gets down and receives from signal decode data the frequency data of a local station, the frequency data of a circumference base station, and one frame after.

[0044] Moreover, the user data ON/OFF judging section 118 is the processing section which judges whether user data exist in degree frame from the user data ON/OFF information detected in the control data detecting element 110. And the synthesizer change timing control section 117 When user data do not exist in degree frame based on the output of the user data ON/OFF judging section 118 While switching the frequency of the local signal for reception which the local synthesizer 104 outputs in the user data field of degree frame from a local station frequency (f1) to a circumference base station frequency (f2, f3) When user data exist, it is the control section which generates the change control signal which holds a local station frequency (f1) as it is.

[0045] On the other hand, the voice data inputted from a terminal 111 is encoded in the voice encoding processing section 112. The transmit data composition section 113 is a circuit which compounds going-up control data, such as this encoded transmitting voice data and output data of the receiving level test section 109, and generates transmit data.

[0046] ** and D/A converter 115 are circuits which analog-ize a modulating signal in the circuit which performs a diffusion modulation in the modulation section's 114 modulating QPSK etc. to transmit data and applying to a CDMA system. The transmitting section 116 is the local signal for transmission inputted from the local synthesizer 104, and is baseband or a circuit which carries out frequency conversion of the modulating signal of IF to a transmitting RF signal.

[0047] Although the local synthesizer 104 also generates the local signal for reception for carrying out the monitor of the receiving level from a circumference base station other than the local signal for reception of a local station, and the local signal for transmission, the change of the frequency is controlled by the above-mentioned change-over timing control section 117.

[0048] The data communication unit constituted as mentioned above explains along the timing chart showing the actuation in the case of carrying out the monitor of the receiving level of a circumference base station in drawing 2 . By drawing 2 , user data, such as voice which should communicate, exist and the condition that simultaneous transmission and reception is performed continuously is explained to an example.

[0049] Moreover, in the gestalt 1 of operation, it gets down, and the frame format of a signal (a) is a continuous ringing which the configuration of one-frame three slots as shown in drawing 2 has, and each slot data consists of a control data field which consists of pilot symbol data and control data, and a user data field which transmits user data, such as voice. And user data are voice, and a base station side shall get down and shall have a VOX function (function which turns on voice data at the time of an owner sound, and turns off voice data at the time of silent) to a sound signal.

[0050] Furthermore, the circumference base station which a local station should get down, should set signal received frequency to f1, and should carry out the monitor of the receiving level shall set each received frequency to f2 and f3 by two, and these frequency data shall be contained in the control data within a slot. And the user data ON/OFF information which shows whether user data (voice data) exist in degree frame shall also be included in this control data.

[0051] The local station of received frequency f1 which has the above-mentioned frame format gets down, a signal (b) is received, the control data detecting element 110 gets down, and a data communication unit detects control data from a signal, and sends the user data ON/OFF information which is some control data to the user data ON/OFF judging section 118.

[0052] a frame 0 -- user data ON/OFF information -- ON and assignment -- now, since it is, in the user data ON/OFF judging section 118, it judges with user data existing with the following frame 1. Consequently, in a frame 1, the synthesizer change timing control section 117 does not perform a switch of the local signal frequency for reception of the local synthesizer 104, but holds received frequency in the condition of f1. On the other hand, actuation of the receiving level test section 109 in a frame 0 measures the average receiving level of the local station within a frame using the recovery signal of the slot 0 which constitutes one frame, a slot 1, and a slot 2.

[0053] Next, with a frame 1, since user data exist, in the receiving level test section 11, the average receiving level in a frame of a local station is measured like a frame 0. On the other hand, since user data ON/OFF information is specified as OFF with this frame 1, by the user data ON/OFF judging section 118, it judges with the user data of all three slots not existing with the following frame 2. Consequently, in a frame 2, the synthesizer change timing control section 117 is controlled to switch a frequency setup of the local synthesizer 104 to the local signal frequency for reception corresponding to the received frequency of the circumference base station specified for every user data field of each slot.

[0054] And the receiving level of the circumference base station specified in each user data field section is measured to the timing shown in a signal (c) and (d). That is, at the pilot symbol of the slot 0 of a frame 2, and a control data field, while holding received frequency with f1 and performing the pilot symbol of a current input signal, and the recovery of control data, by the user data field of a slot 0, it switches to the received frequency f2 of a circumference base station, and the receiving level of the circumference base station of a receiving level test-section 109 smell lever is measured.

[0055] Subsequently, at the pilot symbol of a slot 1, and a control data field, while switching received frequency to f1 again and performing the recovery of a pilot symbol and control data, by the user data field of a slot 1, it switches to the received frequency f3 of a circumference base station, and the receiving level of the circumference base station of a receiving level test-section 109 smell lever is measured.

[0056] Furthermore, at the pilot symbol of a slot 2, and a control data field, received frequency is again switched to f1, the recovery of a pilot symbol and control data is performed, by the user data field of a slot 2, it switches to the received frequency f2 of a circumference base station again, and the receiving level of the circumference base station of a receiving level test-section 109 smell lever is measured.

[0057] Next, since the user data ON/OFF information included in the control data detected with this frame 2 is specified as OFF, in the user data ON/OFF judging section 118, it judges with the user data of all three slots not existing in the following frame 3. Consequently, with a frame 3, receiving level measurement of a circumference base station is performed like a frame 2.

[0058] Furthermore, since the user data ON/OFF information included in the control data detected with the following frame 3 is specified as ON, in the user data ON/OFF judging section 118, it judges with user data existing in the following frame 4, and with a frame 4, received frequency is switched to f1 and the same reception actuation as the above-mentioned frame 0 or a frame 1 is performed.

[0059] As mentioned above, the synthesizer change timing control section 117 will switch the frequency of low calcine SASEIZA 104 to the timing shown in a signal (e).

[0060] In addition, the judgment result of the user data ON/OFF judging section 118 is sent also to the voice decoding section 107. In the voice decoding section 107, mute processing and background-noise addition are performed with the frame whose voice data is OFF based on this judgment result, without performing decode of the data of a user data field.

[0061] Moreover, in the receiving level test section 109, in order to raise the accuracy of measurement of circumference base station receiving level, the average value of the receiving level of the circumference base station of the received frequency f2 measured with the frame 2 and the frame 3 is calculated, and it is constituted so that the result may be made into the average receiving level of the circumference base station of a frequency f2. Similarly, average receiving level is calculated also about the receiving level of the circumference base station of received frequency f3.

[0062] Next, the average receiving level of the local station measured by the receiving level test section 109, the average receiving level of the circumference base station of received frequency f2, and the average receiving level of the circumference base station of received frequency f3 are included in transmit data in the transmit data composition section 113 as uphill control data, respectively, and are transmitted to the base station under current connection. In a base station side, handover control is performed based on the average receiving level of the mobile station and the average receiving level of a circumference base station which were notified from the mobile station.

[0063] two or more receiving level monitor **** of the local station of received frequency and circumference base station which are different with one receiving set although the hardware scales of a mobile station are reduced according to the gestalt of operation of this invention as mentioned above when user data carry out the monitor of the receiving level of a local station in the section of ON and user data carry out the monitor of the receiving level of a circumference base station in the section of OFF -- things are made. Moreover, since the object base station which detects receiving level was switched one by one in one frame, the monitor of the receiving level of two or more circumference base stations can be carried out quickly.

[0064] (Gestalt 2 of operation) Subsequently to the gestalt 2 of operation of this invention, the data telecommunication system to apply is explained using a drawing. Drawing 3 is the receiving timing chart of the input signal from the office for a communication link and circumference base station of a gestalt 2 of operation. In addition, the configuration of a data communication unit is the same as that of the gestalt 1 of operation.

[0065] The difference with the gestalt 1 of operation is with the timing which performs the monitor of the receiving level of a circumference base station, and the switch timing of the setting frequency to the local synthesizer 104.

[0066] That is, although sequential receiving level was detected to two or more circumference base stations with the gestalt 1 of operation, with the gestalt 3 of operation, by the frame 2, receiving level of the 1st circumference base station was detected, and it considered [the frame 3] as the configuration which detects receiving level continuously to the same circumference base station by Naka of one frame as receiving level of the 2nd circumference base station was detected. And corresponding to it, it was made to switch the setting frequency of the local synthesizer 104. The point which computes the average of the receiving level measured respectively and raises the accuracy of measurement is the same as the gestalt 1 of operation.

[0067] In addition, when there are two or more base stations which should detect receiving level, to memorize the base station which the monitor ended and what is necessary is just made to perform a monitor cyclically.

[0068] two or more receiving level monitor **** of the local station of received frequency and circumference base station which according to this approach are different like the gestalt 1 of operation with one receiving set although the hardware scales of a mobile station are reduced -- things are made. Moreover, a switch of an object base station and a frequency can be performed easily, and the detection precision of receiving level also improves.

[0069] (Gestalt 3 of operation) Subsequently to the gestalt 3 of operation of this invention, the data telecommunication system to apply is explained using a drawing. Drawing 4 is the block diagram showing the configuration of the data communication unit used for the data telecommunication system concerning the gestalt 3 of operation of this invention, and drawing 5 is the receiving timing chart of the input signal from the office for a communication link and circumference base station of a gestalt 3 of operation. Since the basic configuration of drawing 4 is the same as that of the block diagram of the gestalt 1 of operation shown in drawing 1 , the same component attaches the same number and omits explanation.

[0070] With the gestalt 3 of operation, we decided to newly form the level judging section 401 and the synthesizer change timing control section 402. It is the circuit which judges whether the level judging section 401 is larger than the threshold to which the receiving level of the local station measured in the receiving level test section 109 was set. And when local station receiving level is under a threshold, while the synthesizer change timing control section 402 switches the oscillation frequency for reception of the local synthesizer 104 from a local station to circumference base stations in the user data field of the slot as which degree frame was specified based on the output of the level judging section 401, when local station receiving level is beyond a threshold, it generates the control signal for holding the object for local stations as it is.

[0071] The data communication unit constituted as mentioned above explains along the timing chart showing the actuation in the case of carrying out the monitor of the receiving level of a circumference base station in drawing 5 .

[0072] First, it gets down, and in the frame 0 of a signal (a), the local station which is shown in drawing 5 and whose received frequency is f1 gets down, a receive section 103 receives a signal (b), and the average receiving level of the local station within a frame is measured in the receiving level test section 109 using the recovery signal of the slot 0 in a frame, a slot 1, and a slot 2. Next, in the level judging section 401, the comparison with the above-mentioned average receiving level and the set-up threshold Lth is performed, and it judges whether the average receiving level of the measured local station is beyond a threshold.

[0073] Consequently, when average receiving level is beyond a threshold, in the following frame 1, the synthesizer change timing control section 402 does not switch local signal frequency for reception to the local synthesizer 104, but holds received frequency with f1.

[0074] Similarly, in the receiving level test section 109, the average receiving level in a frame of a local station is measured also with a frame 1. On the other hand, in the level judging section 401, it judges with the average receiving level of a frame 1 being under a threshold. Consequently, in the following frame 2, the synthesizer change timing control section 402 is controlled only by the user data field of the specified slot (here the 3rd slot) to the local synthesizer 104 to switch to the local signal frequency for reception corresponding to the received frequency (f2) of the specified circumference base station. And the receiving level of the circumference base station specified in the user data field of the specified slot is measured, and the average receiving level of a local station is measured by the other receiving slot.

[0075] That is, the pilot symbol of the slot 0 of a frame 2, a slot 1, and a slot 2 and a control data field hold received frequency with f1, perform the recovery of a pilot symbol and control data, and user data, and also measure the average receiving level of a local station in the receiving level test section 109 in the section of a slot 0 and a slot 1. Subsequently, in the user data field of a slot 2, it switches to the received frequency f2 of a circumference base station, and the receiving level of a circumference base station is measured by the receiving level test section 109.

[0076] On the other hand, it is judged with the average receiving level of the local station measured using the recovery signal of the slot 0 of a frame 2 and a slot 1 being under a threshold in the level judging section 401. Consequently, with the following frame 3, like a frame 2, it switches to the frequency f3 of the circumference base station which the average receiving level of a local station was measured [base station] and had received frequency specified in the user data field of a slot 2, and the receiving level of the circumference base station of a receiving level test-section 109 smell lever is measured by the slot 0 and the slot 1.

[0077] Subsequently, since it is judged with the average receiving level of the local station measured using the input signal of the slot 0 of this frame 3 and a slot 1 being beyond a threshold in the level judging section 401, with the following frame 4, received frequency is switched to f1, and receiving level measurement of a circumference base station is not performed, but the same reception actuation as the above-mentioned frame 0 or a frame 1 is performed.

[0078] In order to interrupt the communication link with the base station under communication link, user data, such as speech information, will be missing in the circumference level monitor section of the frame 2 and frame 3 which perform the monitor of the receiving level of a circumference base station. Then, using the user data of the already received frame, the voice decoding section 107 performed audio interpolation processing etc., and was taken as the configuration which prevents lack of received data.

[0079] In addition, although the slot 2 which is the 3rd slot as an object for circumference level measurement was specified in the gestalt 3 of operation, if it leaves at least one slot for measuring the receiving level of a local station in one frame, other one slot or two or more slots can also be specified as an object for circumference level measurement.

[0080] As mentioned above, when it becomes under the threshold to which the receiving level of a local station was set even when simultaneous transmission and reception was performed continuously according to the gestalt 3 of operation, by carrying out the monitor of the receiving level of a circumference base station in the user data field of the predetermined slot of the following frame, a monitor of two receiving level, the local station of received frequency and a circumference base station, which is different with one receiving set can be performed, and the hardware scales of a mobile station can be reduced.

[0081] Moreover, when there is no VOX function in the base station stated by the gestalt 1 of operation or 2 of as opposed to [get down and] a signal according to the gestalt 3 of operation, or even when it gets down and user data ON/OFF information is not included in control data, the circumference base station receiving level monitor by the side of a mobile station can be made possible.

[0082] (Gestalt 4 of operation) Subsequently to the gestalt 4 of operation of this invention, actuation of the data telecommunication system to apply is explained along with drawing 6 which shows the receiving timing of the input signal from the office for a communication link, and a circumference base station. The configuration of a data communication unit is the same as that of the gestalt 3 of operation.

[0083] As for the gestalt 4 of operation, the receiving level measuring method of a circumference base station when the receiving level of a local station becomes under a threshold differs from the gestalt 3 of operation. With the gestalt 4 of operation, it considered as the configuration which performs receiving level measurement intermittently by at least two after the frame with which the receiving level of a local station was judged to be under a threshold.

[0084] That is, in the frame 0 shown in drawing 6 , when judged with the receiving level of a local station being under the threshold Lth, with the following frame 1, all the user data fields of each slot are assigned as an object for receiving level measurement of a circumference office, it switches to the frequency of the circumference base station which had received frequency specified for every slot, receiving level measurement of a circumference base station is performed, and receiving level measurement of a local station is not performed. Furthermore, in the following frame 2, conversely, receiving level measurement of a circumference base station is not performed, but it usually passes and receiving level measurement of a local station and decode of user data are performed.

[0085] For example, receiving level measurement of the circumference base station of a frequency f2 is performed by the slot 0 of a frame 1, receiving level measurement of the circumference base station of a frequency f3 is performed by the slot 1, and it is made to perform receiving level measurement of the circumference base station of a frequency f2 in drawing 6 again in a slot 2.

[0086] Subsequently, with a frame 2, the receiving level of a local station is measured and a threshold judging is performed in the level judging section 401. In this frame 2, since it is judged with the receiving level of a local station being under a threshold, with a frame 3 and a frame 4, the same actuation as the above-mentioned frame 1 and a frame 2 is repeated. However, since it has finished with receiving level measurement of the circumference base station of a frequency f2 in the frame 1, suppose that measurement of the receiving level of the circumference base station in a frame 3 is started from receiving level measurement of the circumference base station of a frequency f3.

[0087] In addition, in the receiving level test section 109, the average receiving level to each circumference base station is calculated like the gestalt 3 of operation using the receiving level of the circumference base station obtained with each frame. Moreover, with the frame which performs receiving level measurement of a circumference base station, like the gestalt 3 of operation, the voice decoding section 107 performs audio interpolation processing etc., without performing decode of the data of a user data field, and prevents lack of received data.

[0088] Thus, with the gestalt 4 of operation, when the receiving level of a local station becomes under a threshold, in order to perform the monitor of the receiving level of the circumference base station set as the object of a handover, the control signal for special monitor directions is not needed by the base station side. Moreover, since it was made to make the frame which receives all the user data from the base station under communication link exist periodically, without performing a monitor continuously, reproducing voice data based on interpolation processing continuously for a long period of time is lost, and degradation of a speech quality can be mitigated.

[0089] (Gestalt 5 of operation) Subsequently to the gestalt 5 of operation of this invention, actuation of the data telecommunication system to apply is explained along with drawing 7 which shows the receiving timing of the input signal from the office for a communication link, and a circumference base station. The configuration of a data communication unit is the same as that of the gestalt 4 of operation. The object circumference base station where the gestalt 5 of operation performs receiving level measurement when the receiving level of a local station becomes under a threshold differs from the gestalt 4 of operation.

[0090] With the gestalt 5 of operation, the same approach as the gestalt 2 of operation is applied as the selection approach of the object base station which measures receiving level, and each slot in one frame was made to perform receiving level measurement of the same circumference base station altogether.

[0091] That is, to the timing shown in a signal (c) and (d), the frequency shown in a signal (e) is used and receiving level of a circumference base station is measured. In the user data field of the slots 0, 1, and 2 of a frame 1, receiving level measurement of the circumference base station of a frequency f2 is performed, and it was made to perform receiving level measurement of the circumference base station of a frequency f3 in the user data field of the slots 0, 1, and 2 of a frame 3.

(Gestalt 6 of operation) Subsequently to the gestalt 6 of operation of this invention, it explains along the block diagram showing actuation of the data telecommunication system to apply in drawing 8 , and the receiving timing chart of the input signal from the office for a communication link, and a circumference base station which shows drawing 9 and drawing 10 . When the receiving level of a local station became under a threshold, it was made to perform the gestalt 6 of operation by the approach which combined the gestalt 3 of the gestalt 1 of operation and operation of measurement of the receiving level of a circumference base station.

[0092] When judged with user data not existing in degree frame in the user data ON/OFF judging section 118, or when judged with the receiving level of a local station being under a threshold in the level judging section 401 The synthesizer change timing control section 402 In the user data field of all the slots of the following frame, or the specified slot, it controls to switch to the local signal frequency for reception corresponding to the received frequency of the circumference base station specified to the local synthesizer 104 (f2, f3).

[0093] That is, with the frame 1 and frame 2 which are shown in drawing 9 , since it is judged with user data not existing in degree frame in the user data ON/OFF judging section 118, in the user data field of a frame 2 and a frame 3, it switches one by one for every slot to the circumference base stations which had received frequency specified, and receiving level measurement of each circumference base station is performed in the receiving level test section 109. Thus, about the frame in which user data do not exist, since it was not necessary to perform the threshold judging of the local station receiving level in the level judging section 401, the existence of circumference base station receiving level measurement was determined only by the ON/OFF judging of user data.

[0094] Moreover, although judged with user data existing in degree frame in the user data ON/OFF judging section 118 with the frame n+1 and frame n+2 which are shown in drawing 10 Since it is judged with the receiving level of a local station being under a threshold in the level judging section 401, in the user data field of the slot 2 of a frame n+2 and a frame n+3 It switches to the circumference base stations which had received frequency specified, and receiving level measurement of each circumference base station is performed in the receiving level test section 109.

[0095] Since the situation which measures the receiving level of a circumference base station compared with the gestalt 1 of operation and the gestalt 3 of operation can be increased according to the gestalt 6 of operation, a measurement count can increase so much and the accuracy of measurement of the circumference base station average receiving level within the same measuring time can be raised.

[0096] (Gestalt 7 of operation) Subsequently to the gestalt 7 of operation of this invention, it explains along the block diagram showing actuation of the data telecommunication system to apply in drawing 11 , and the receiving timing chart of the input signal from the office for a communication link, and a circumference base station which shows drawing 12 and drawing 13 . In the gestalt 1 of operation, and the gestalt 2 of operation, the gestalt 7 of operation adds the function which turns off a receive section 103, A/D converter 105 for reception, and the recovery section 106 in the time zone which measures the receiving level of a circumference base station, when receiving level measurement of a base station to a circumference base station is not directed.

[0097] Although the fundamental circuitry of the gestalt 7 of operation is the same as that of the gestalt 1 of operation The circumference base station receiving level measurement tbe data which direct whether to get down and perform receiving level measurement of a circumference base station to the control data of a signal (b) with the gestalt 7 of operation are contained. According to the output of the control data detecting element 110 which detects this, and this control data detecting element 110, the receiving ON/OFF control section 1001 which controls ON/OFF of a receive section 103, A/D converter 105 for reception, and the recovery section 106 was formed in the data communication unit side.

[0098] This receiving ON/OFF control section 1001 is based on the circumference base station receiving level measurement directions data detected from the input signal (b) in the control data detecting element 110. When receiving level measurement of a circumference base station is directed, while always changing a receive section 103, A/D converter 105 for reception, and the recovery section 106 into ON condition When receiving level measurement of a circumference base station is not directed, based on the judgment result in the user data ON/OFF judging section 118, control which changes a receive section 103, A/D converter 105 for reception, and the recovery section 106 into an OFF condition by the user data field in which user data do not exist is performed.

[0099] First, the control data detecting element 110 detects and extracts circumference base station receiving level measurement directions data from an input signal (b), and sends this to the receiving ON/OFF control section 1001.

[0100] In the receiving ON/OFF control section 1001, when there are circumference base station receiving level measurement directions, a receive section 103, A/D converter 105 for reception, and the recovery section 106 are changed into ON condition, and as shown in drawing 12 , receiving level measurement actuation of the same circumference base station as the gestalt 1 of operation is performed.

[0101] on the contrary, when there are no circumference base station receiving level measurement directions Judge in the user data ON/OFF judging section 118, and if the judgment result is the user data OFF As shown in drawing 13 , in the user data field of the slots 0, 1, and 2 of the frames 2 and 3 which are the time zones which perform receiving level measurement of a circumference base station, a receive section 103, A/D converter 105 for reception, and the recovery section 106 are changed into an OFF condition. Receiving level measurement of a circumference base station is not performed, conversely, if it is the user data ON, a receive section 103, A/D converter 105 for reception, and the recovery section 106 will be changed into ON condition, and receiving level measurement of a circumference base station will not be performed.

[0102] Thus, since a receive section 3, the A/D converter for reception, and the recovery section 8 are changed into an OFF condition in the time zone which should measure the receiving level of a circumference base station when receiving level measurement of a circumference base station is not specified according to the gestalt 7 of operation, even if it is the case where user data are OFF, low-power-ization of a mobile station can be attained so much.

[0103] (Gestalt 8 of operation) Subsequently to the gestalt 8 of operation of this invention, it explains along the block diagram showing actuation of the data telecommunication system to apply in drawing 14 , and the receiving timing chart of the input signal from the office for a communication link, and a circumference base station which shows drawing 15 and drawing 16 . In the gestalt 3 of operation, the gestalt 4 of operation, and the gestalt 5 of operation, the gestalt 8 of operation adds the function which turns off a receive section 103, A/D converter 105 for reception, and the recovery section 106 in the time zone which measures the receiving level of a circumference base station, when receiving level measurement of a base station to a circumference base station is not directed.

[0104] Although the fundamental circuitry of the gestalt 8 of operation is the same as that of the gestalt 3 of operation With the gestalt 8 of operation, it gets down like the gestalt 7 of operation. To the control data of a signal (b) The circumference base station receiving level measurement tbe data which direct whether perform receiving level measurement of a circumference base station are contained. To a data communication unit side According to the output of the control data detecting element 110 which detects this, and this control data detecting element 110, the receiving ON/OFF control section 1001 which controls ON/OFF of a receive section 103, A/D converter 105 for reception, and the recovery section 106 was formed. These actuation is the same as that of the gestalt 7 of operation.

[0105] First, the control data detecting element 110 detects and extracts circumference base station receiving level measurement directions data from an input signal (b), and sends this to the receiving ON/OFF control section 1001.

[0106] In the receiving ON/OFF control section 1001, when there are circumference base station receiving level measurement directions, a receive section 103, A/D converter 105 for reception, and the recovery section 106 are changed into ON condition, and as shown in drawing 15 , in the user data field of the slot 2 of frames 2 and 3, receiving level measurement actuation of the same circumference base station as the gestalt 3 of operation is performed.

[0107] on the contrary, when there are no circumference base station receiving level measurement directions Perform a judgment in the level judging section 401, and if receiving level is under a predetermined threshold, a judgment result As shown in drawing 16 , in the user data field of the slot 2 of the frames 2 and 3 which are the time zones which perform receiving level measurement of a circumference base station, a receive section 103, A/D converter 105 for reception, and the recovery section 106 are changed into an OFF condition. Receiving level measurement of a circumference base station is not performed, and conversely, if receiving level is beyond a predetermined threshold, a judgment result will change a receive section 103, A/D converter 105 for reception, and the recovery section 106 into ON condition, and will not perform receiving level measurement of a circumference base station.

[0108] Thus, low-power-ization of a mobile station can be attained according to the gestalt 8 of operation as well as the gestalt 7 of operation.

[0109] In addition, it cannot be overemphasized by combining the gestalt 8 of this operation, and the gestalt 7 of the operation which performs the monitor of the receiving level of a circumference base station by the detection result of the user data ON/OFF judging section that same control can be performed.

[0110] (Gestalt 9 of operation) Subsequently to the gestalt 9 of operation of this invention, actuation of the data telecommunication system to apply is explained. The gestalt 9 of operation is deformation of the gestalt 3 of operation. As opposed to the gestalt 3 of operation being a configuration which starts the monitor of the receiving level of a circumference base station immediately, when the receiving level of the sending signal of the base station equipment under communication link becomes under a predetermined threshold When the receiving level of the sending signal of the base station equipment under communication link became under a predetermined threshold, the gestalt 9 of operation once notifies that to base station equipment, and transmitted the monitor indication signal of the receiving level of a circumference base station to mobile station equipment from the base station equipment side

which received this notice. It is transmitted to base station equipment and control station equipment, and this monitor result is used for handover control.
[0111]
[Effect of the Invention] Even if it is the case where user data, such as voice which should communicate, exist continuously according to this invention so that clearly from the above explanation, when user data do not exist, Or since a mobile station can carry out the monitor of the receiving level of a circumference base station when the receiving level of a communication link base station falls, Without [without it affects a message and data communication, and] causing increase of the control burden of a base station, the monitor of the receiving level of a circumference base station can be performed to data communication Naka, and proper handover control can be performed.

[Translation done.]

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3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The block diagram showing the configuration of the data communication unit used for the data telecommunication system concerning the gestalt 1 of operation of this invention.
[Drawing 2] The receiving timing chart of the input signal from the station for a communication link in a data communication unit and circumference base station of a gestalt 1 of operation.
[Drawing 3] The receiving timing chart of the input signal from the station for a communication link in the data communication unit used for the data telecommunication system concerning the gestalt 2 of operation of this invention, and a circumference base station.
[Drawing 4] The block diagram showing the configuration of the data communication unit used for the data telecommunication system concerning the gestalt 3 of operation of this invention.
[Drawing 5] The receiving timing chart of the input signal from the station for a communication link in a data communication unit and circumference base station of a gestalt 3 of operation.
[Drawing 6] The receiving timing chart of the input signal from the station for a communication link in the data communication unit used for the data telecommunication system concerning the gestalt 4 of operation of this invention, and a circumference base station.
[Drawing 7] The receiving timing chart of the input signal from the station for a communication link in the data communication unit used for the data telecommunication system concerning the gestalt 5 of operation of this invention, and a circumference base station.
[Drawing 8] The block diagram showing the configuration of the data communication unit used for the data telecommunication system concerning the gestalt 6 of operation of this invention.
[Drawing 9] The receiving timing chart of the input signal from the station for a communication link in a data communication unit and circumference base station of a gestalt 6 of operation.
[Drawing 10] The receiving timing chart of the input signal from the station for a communication link in a data communication unit and circumference base station of a gestalt 6 of operation.
[Drawing 11] The block diagram showing the configuration of the data communication unit used for the data telecommunication system concerning the gestalt 7 of operation of this invention.
[Drawing 12] The receiving timing chart of the input signal from the station for a communication link in a data communication unit and circumference base station of a gestalt 7 of operation.
[Drawing 13] The receiving timing chart of the input signal from the station for a communication link in a data communication unit and circumference base station of a gestalt 7 of operation.
[Drawing 14] The block diagram showing the configuration of the data communication unit used for the data telecommunication system concerning the gestalt 8 of operation of this invention.
[Drawing 15] The receiving timing chart of the input signal from the station for a communication link in a data communication unit and circumference base station of a gestalt 8 of operation.
[Drawing 16] The receiving timing chart of the input signal from the station for a communication link in a data communication unit and circumference base station of a gestalt 8 of operation.
[Drawing 17] The block diagram showing the configuration of the conventional data communication unit.
[Drawing 18] The receiving timing chart of the input signal from the conventional station for a communication link in a data communication unit and a conventional circumference base station.
[Description of Notations]
106 Recovery Section
109 Receiving Level Test Section
110 Control Data Detecting Element

117 Synthesizer Change Timing Control Section
118 User Data ON/OFF Judging Section
401 Level Judging Section

[Translation done.]

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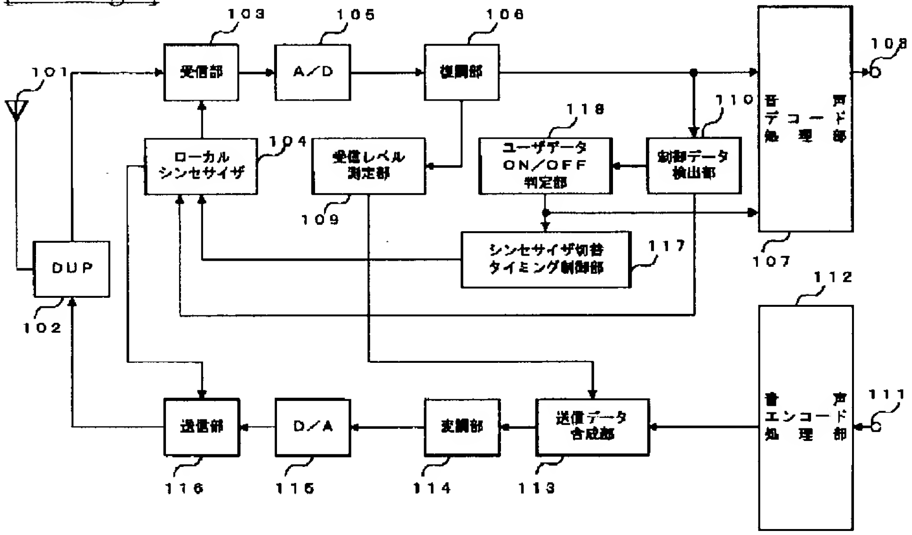
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]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処理部
108
109
受信レベル
測定部
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制御データ
検出部
111
112
音声
エンコード
処理部
113
送信データ
合成部
114
変調部
115
D/A
116
送信部
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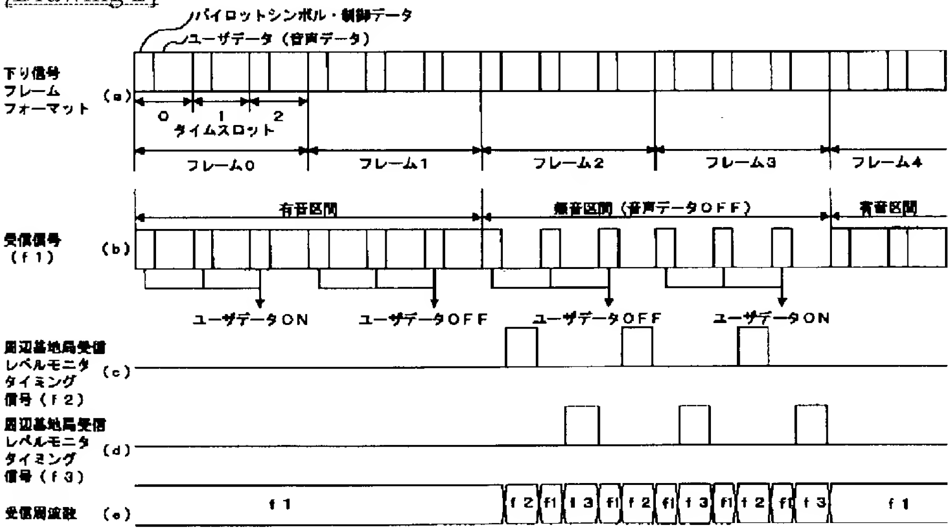
シンセサイザ切替
タイミング制御部
118
ユーザデータ
ON/OFF
判定部

[Drawing 2]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タイミング
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レベルモニタ
タイミング
信号（f3）
(d)
受信周波数
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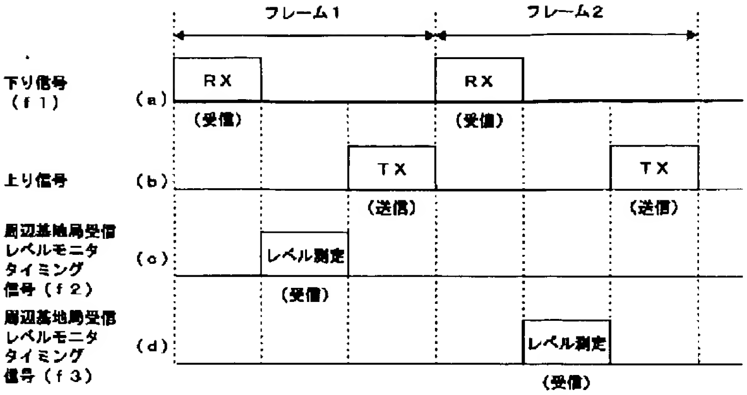
f1

[Drawing 18]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(c)
レベル測定
（受信）
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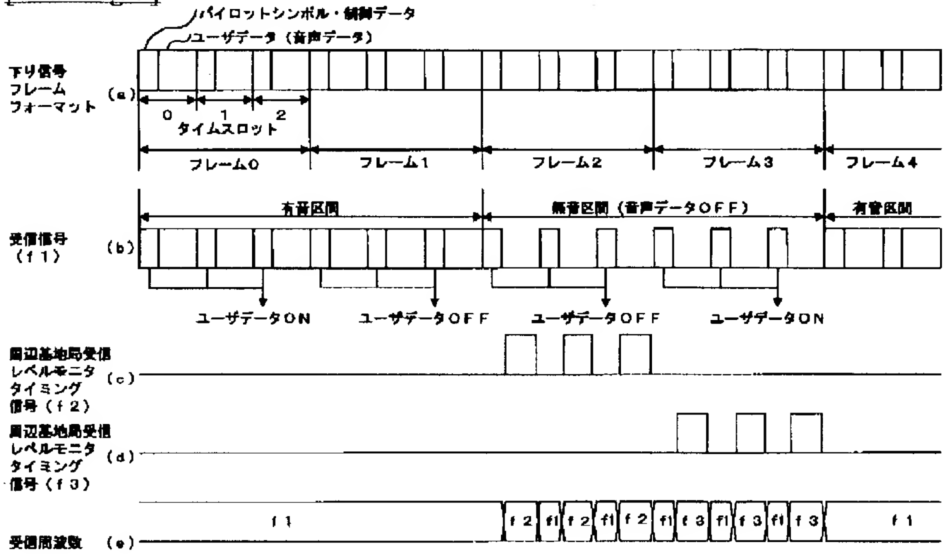
(d)
レベル測定
（受信）

[Drawing 3]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有音区間
受信信号（f 1）
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ユーザデータOFF
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(d)
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f 2
f1
f 2
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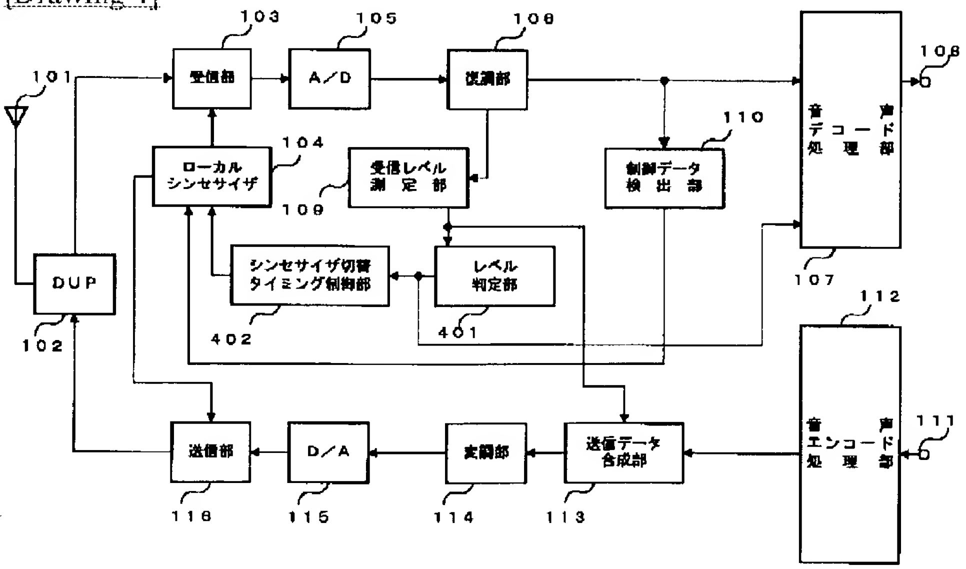
f 3
f1
f 3
f1
f 3
f 1
受信周波数
(e)

[Drawing 4]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制御データ検出部
音声デコード処理部
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シンセサイザ切替タイミング制御部
401
レベル判定部
112
音声エンコード処理部
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変調部
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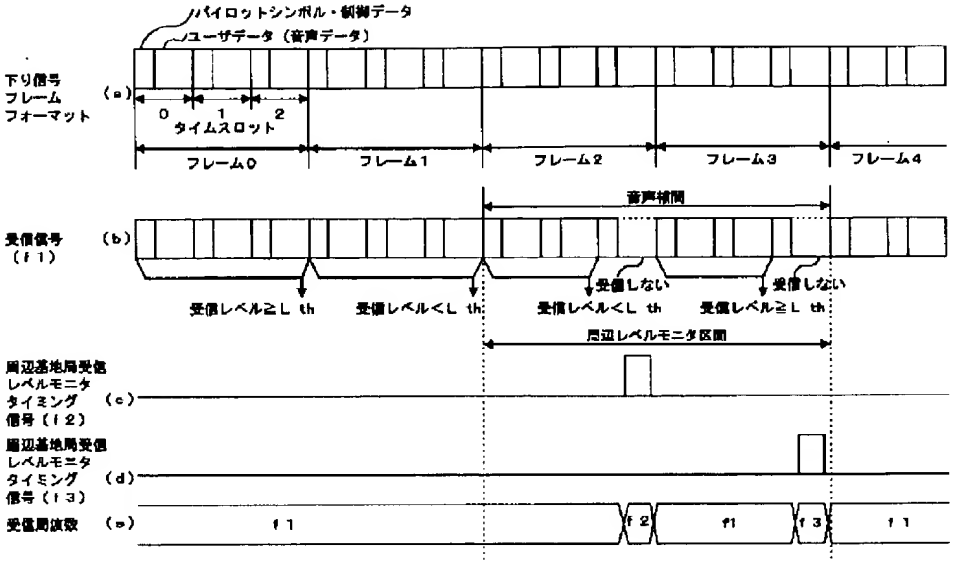
送信データ合成部

[Drawing 5]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(b)
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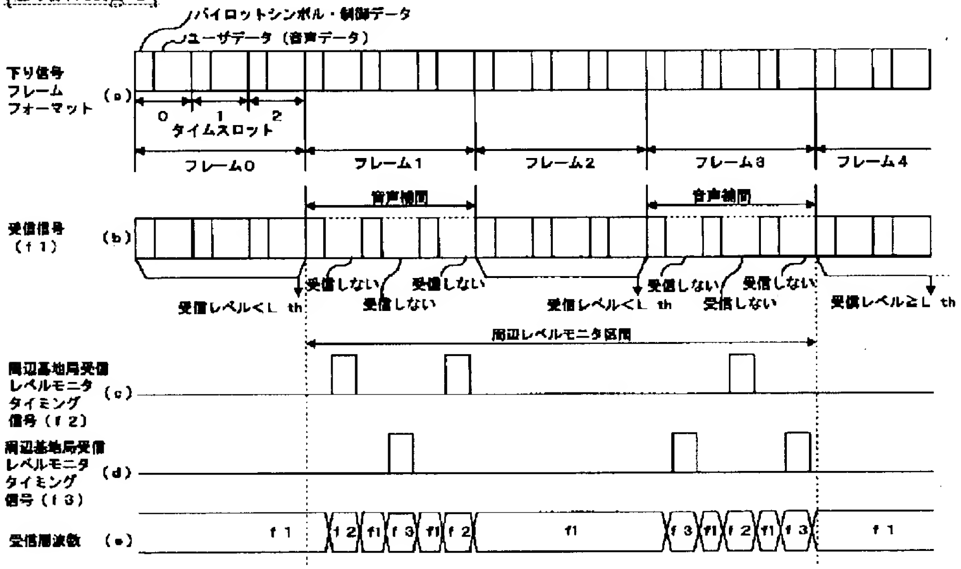
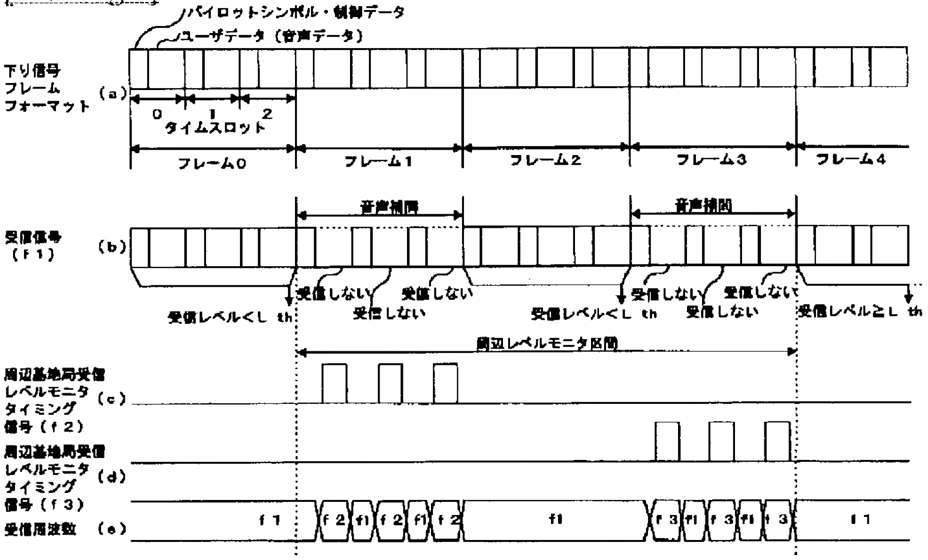
受信しない
受信レベル≧L th
受信レベル＜L th
受信レベル＜L th
受信レベル≧L th
周辺レベルモニタ区間
周辺基地局受信
レベルモニタ
タイミング
信号（f2）
(c)
周辺基地局受信
レベルモニタ
タイミング
信号（f3）
(d)
受信周波数
(e)
f1
f2
f1
f3
f1

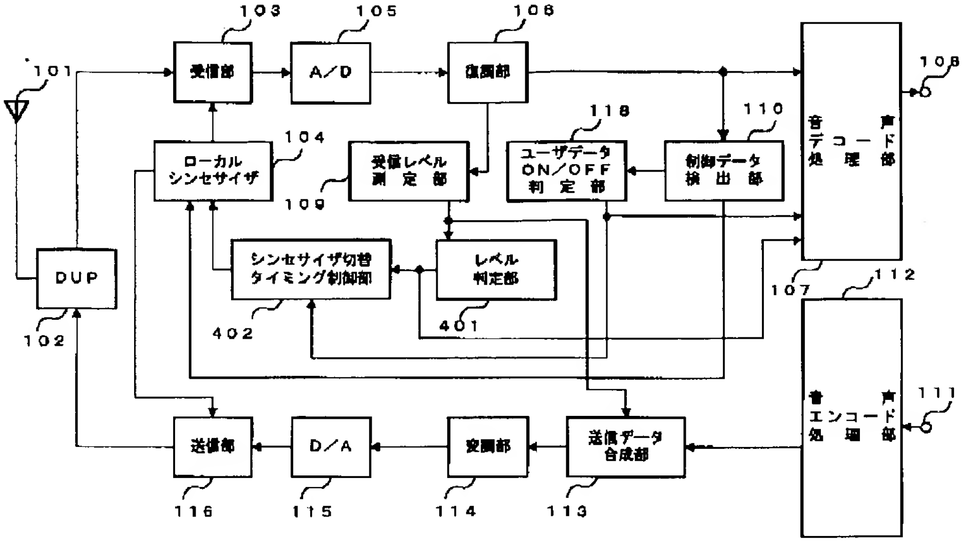
[Drawing 6]


パイロットシンボル・制御データ
ユーザデータ（音声データ）
下り信号
フレーム
フォーマット
(a)
0
1
2
タイムスロット
フレーム0
フレーム1
フレーム2
フレーム3
フレーム4
音声補間
音声補間
受信信号
（f1）
(b)
受信しない
受信しない
受信しない
受信レベル＜L th
受信しない
受信しない
受信しない
受信レベル＜L th
受信レベル≧L th
周辺レベルモニタ区間
周辺基地局受信
レベルモニタ
タイミング
信号（f2）
(c)
周辺基地局受信
レベルモニタ
タイミング
信号（f3）
(d)
受信周波数
(e)
f1
f2
f1
f3
f1
f2
f1
f3
f1
f2
f1
f3
f1

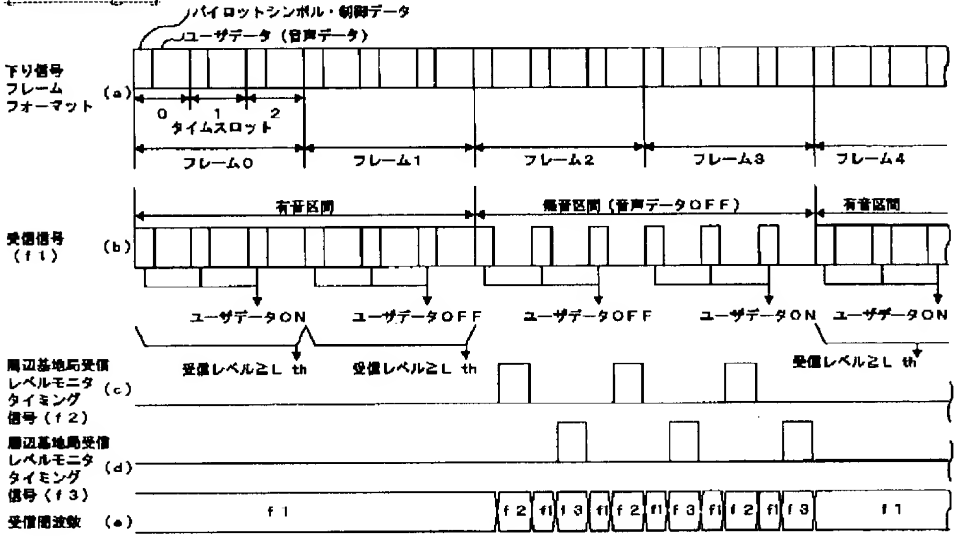
[Drawing 7]


パイロットシンボル・制御データ
ユーザデータ（音声データ）
下り信号
フレーム
フォーマット
(a)
0
1
2
タイムスロット
フレーム0
フレーム1
フレーム2
フレーム3
フレーム4
音声補間
音声補間
受信信号
（f1）
(b)
受信しない
受信しない
受信しない
受信レベル＜L th
受信しない
受信しない
受信しない
受信レベル＜L th
受信レベル≧L th
周辺レベルモニタ区間
周辺基地局受信
レベルモニタ
タイミング
信号（f2）
(c)
周辺基地局受信
レベルモニタ
タイミング
信号（f3）
(d)
受信周波数
(e)
f1
f2
f1
f2
f1
f2
f1
f3
f1
f3
f1
f3
f1

[Drawing 8]


101
102
DUP
103
受信部
105
A／D
106
復調部
108
音声デコード処理部
107
104
ローカルシンセサイザ
109
受信レベル測定部
118
ユーザデータON／OFF判定部
110
制御データ検出部
シンセサイザ切替タイミング制御部
402
レベル判定部
401
112
音声エンコード処理部
111
送信部
116
D／A
115
変調部
114
送信データ合成部
113

[Drawing 9]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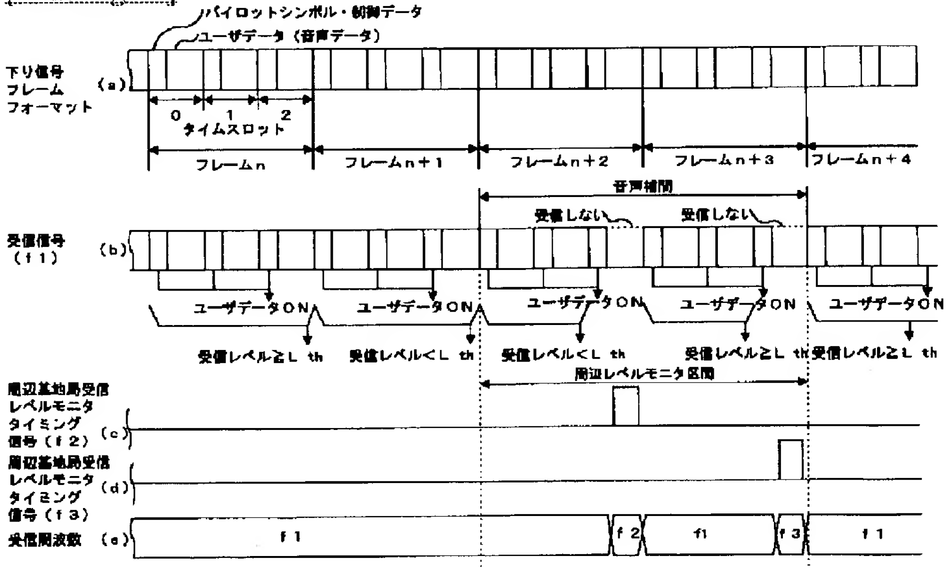
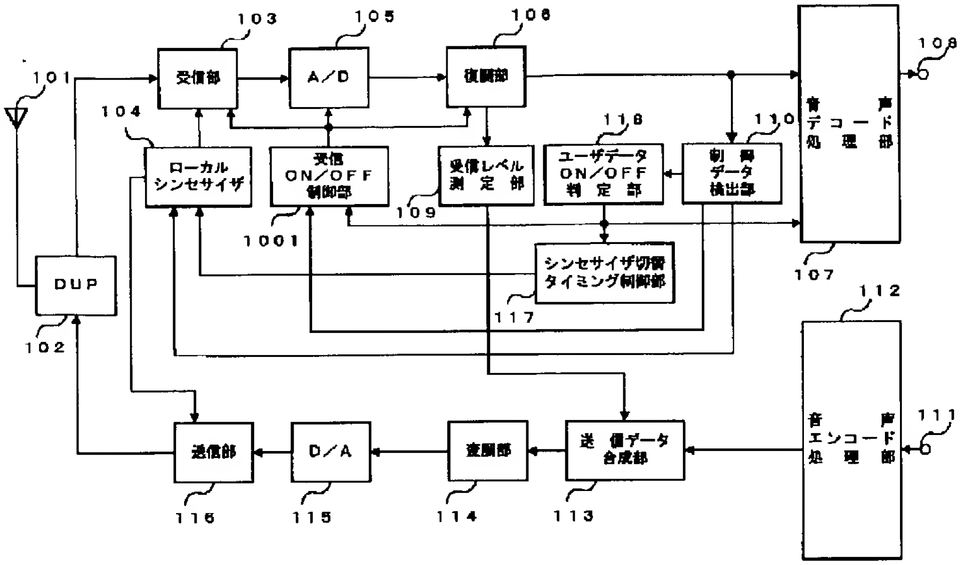
ユーザデータ（音声データ）
下り信号フレームフォーマット
(a)
0
1
2
タイムスロット
フレーム0
フレーム1
フレーム2
フレーム3
フレーム4
有音区間
無音区間（音声データOFF）
有音区間
受信信号（f1）
(b)
ユーザデータON
ユーザデータOFF
ユーザデータOFF
ユーザデータON
ユーザデータON
受信レベル≧L th
受信レベル≧L th
受信レベル≧L th
周辺基地局受信レベルモニタタイミング信号（f2）
(c)
周辺基地局受信レベルモニタタイミング信号（f3）
(d)
受信周波数
(e)
f1
f2
f1
f3
f1
f2
f1
f3
f1
f2
f1
f3
f1

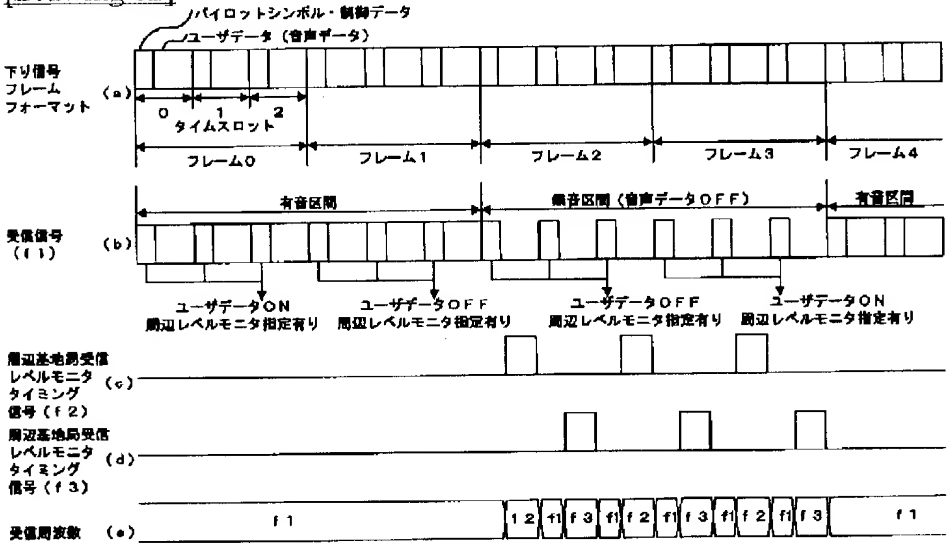
[Drawing 10]


パイロットシンボル・制御データ
ユーザデータ（音声データ）
下り信号フレームフォーマット
(a)
0
1
2
タイムスロット
フレームn
フレームn+1
フレームn+2
フレームn+3
フレームn+4
音声補間
受信しない
受信しない
受信信号（f1）
(b)
ユーザデータON
ユーザデータON
ユーザデータON
ユーザデータON
ユーザデータON
受信レベル≧L th
受信レベル<L th
受信レベル<L th
受信レベル≧L th
受信レベル≧L th
周辺レベルモニタ区間
周辺基地局受信レベルモニタタイミング信号（f2）
(c)
周辺基地局受信レベルモニタタイミング信号（f3）
(d)
受信周波数
(e)
f1
f2
f1
f3
f1

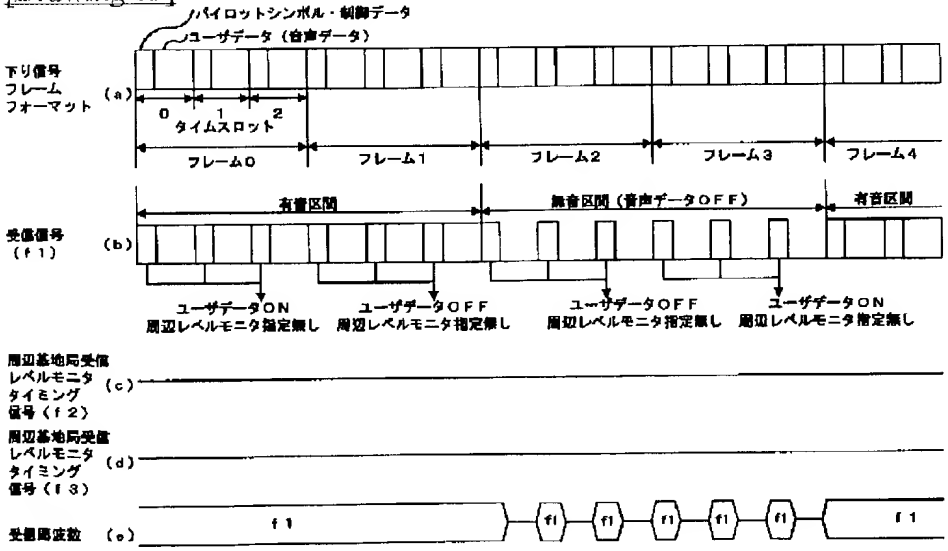
[Drawing 11]


101
102
DUP
103
受信部
104
ローカル
シンセサイザ
105
A/D
106
復調部
107
音声
デコード
処理部
108
109
受信レベル
測定部
110
制御
データ
検出部
111
112
音声
エンコード
処理部
113
送信データ
合成部
114
変調部
115
D/A
116
送信部
117
シンセサイザ切替
タイミング制御部
118
ユーザデータ
ON/OFF
判定部
1001
受信
ON/OFF
制御部

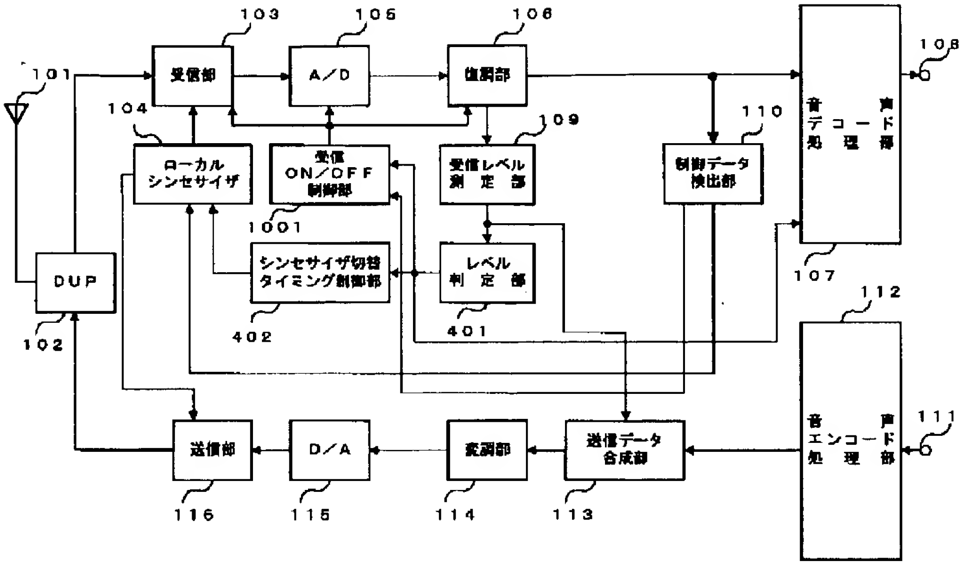
[Drawing 12]


パイロットシンボル・制御データ
ユーザデータ（音声データ）
下り信号
フレーム
フォーマット
(a)
0
1
2
タイムスロット
フレーム0
フレーム1
フレーム2
フレーム3
フレーム4
有音区間
無音区間（音声データOFF）
有音区間
受信信号
（f1）
(b)
ユーザデータON
周辺レベルモニタ指定有り
ユーザデータOFF
周辺レベルモニタ指定有り
ユーザデータOFF
周辺レベルモニタ指定有り
ユーザデータON
周辺レベルモニタ指定有り
周辺基地局受信
レベルモニタ
タイミング
信号（f2）
(c)
周辺基地局受信
レベルモニタ
タイミング
信号（f3）
(d)
受信周波数
(e)
f1
f2
f1
f3
f1
f2
f1
f3
f1
f2
f1
f3
f1

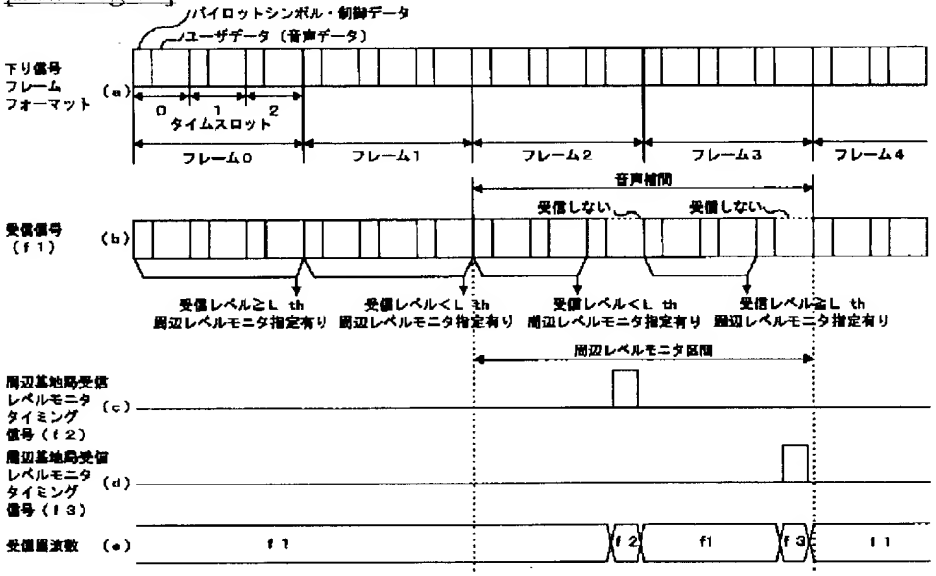
[Drawing 13]


パイロットシンボル・制御データ
ユーザデータ（音声データ）
下り信号
フレーム
フォーマット
(a)
0
1
2
タイムスロット
フレーム0
フレーム1
フレーム2
フレーム3
フレーム4
有音区間
無音区間（音声データOFF）
有音区間
受信信号
（f1）
(b)
ユーザデータON
周辺レベルモニタ指定無し
ユーザデータOFF
周辺レベルモニタ指定無し
ユーザデータOFF
周辺レベルモニタ指定無し
ユーザデータON
周辺レベルモニタ指定無し
周辺基地局受信
レベルモニタ
タイミング
信号（f2）
(c)
周辺基地局受信
レベルモニタ
タイミング
信号（f3）
(d)
受信周波数
(e)
f1
f1
f1
f1
f1
f1
f1

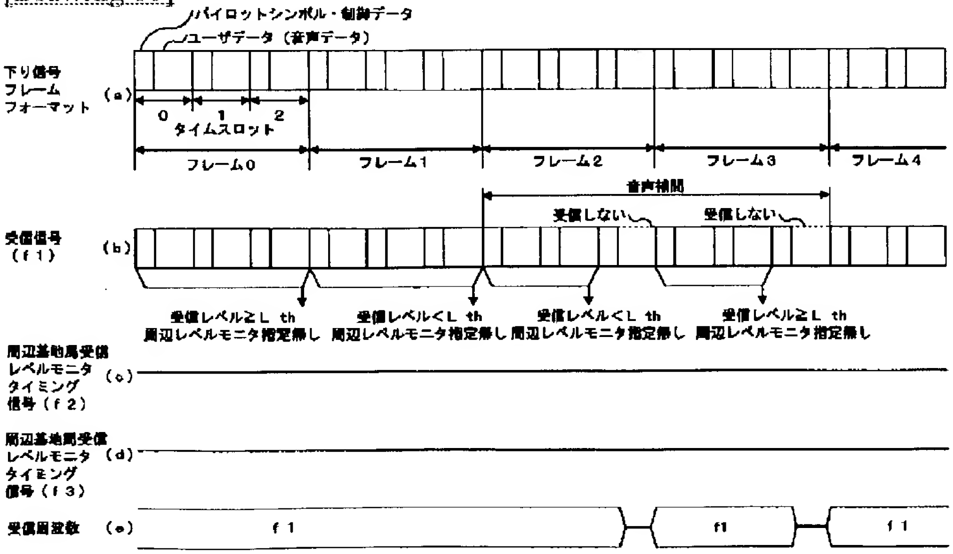
[Drawing 14]


101
102
DUP
103
受信部
104
ローカル
シンセサイザ
105
A／D
1001
受信
ON／OFF
制御部
106
復調部
109
受信レベル
測定部
401
レベル
判定部
402
シンセサイザ切替
タイミング制御部
110
制御データ
検出部
107
音声
デコード
処理部
108
112
音声
エンコード
処理部
111
113
送信データ
合成部
114
変調部
115
D／A
116
送信部

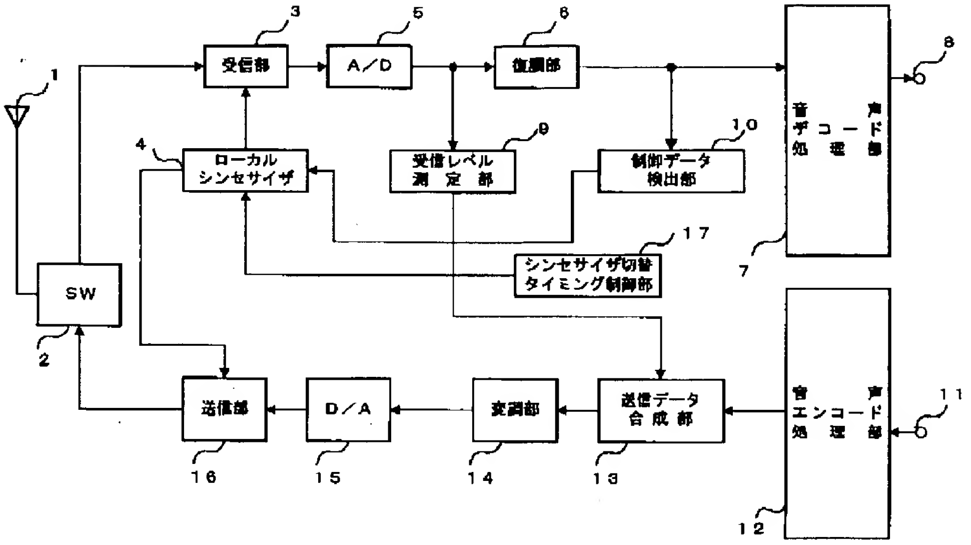
[Drawing 15]


パイロットシンボル・制御データ
ユーザデータ（音声データ）
下り信号
フレーム
フォーマット
(a)
0
1
2
タイムスロット
フレーム0
フレーム1
フレーム2
フレーム3
フレーム4
音声補間
受信しない
受信しない
受信信号
（f1）
(b)
受信レベル≧L th
周辺レベルモニタ指定有り
受信レベル<L th
周辺レベルモニタ指定有り
受信レベル<L th
周辺レベルモニタ指定有り
受信レベル≧L th
周辺レベルモニタ指定有り
周辺レベルモニタ区間
周辺基地局受信
レベルモニタ
タイミング
信号（f2）
(c)
周辺基地局受信
レベルモニタ
タイミング
信号（f3）
(d)
受信周波数
(e)
f1
f2
f1
f3
f1

[Drawing 16]


パイロットシンボル・制御データ
ユーザデータ（音声データ）
下り信号
フレーム
フォーマット
(a)
0
1
2
タイムスロット
フレーム0
フレーム1
フレーム2
フレーム3
フレーム4
音声補間
受信しない
受信しない
受信信号
（f1）
(b)
受信レベル≧L th
周辺レベルモニタ指定無し
受信レベル<L th
周辺レベルモニタ指定無し
受信レベル<L th
周辺レベルモニタ指定無し
受信レベル≧L th
周辺レベルモニタ指定無し
周辺基地局受信
レベルモニタ
タイミング
信号（f2）
(c)
周辺基地局受信
レベルモニタ
タイミング
信号（f3）
(d)
受信周波数
(e)
f1
f1
f1

[Drawing 17]


3
5
6
受信部
A/D
復調部
1
8
音声デコード処理部
4
ローカルシンセサイザ
9
受信レベル測定部
10
制御データ検出部
17
シンセサイザ切替タイミング制御部
7
SW
2
11
音声エンコード処理部
送信部
D/A
変調部
送信データ合成部
16
15
14
13
12

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The block diagram showing the configuration of the data communication unit used for the data telecommunication system concerning the gestalt 1 of operation of this invention.
[Drawing 2] The receiving timing chart of the input signal from the station for a communication link in a data communication unit and circumference base station of a gestalt 1 of operation.
[Drawing 3] The receiving timing chart of the input signal from the station for a communication link in the data communication unit used for the data telecommunication system concerning the gestalt 2 of operation of this invention, and a circumference base station.
[Drawing 4] The block diagram showing the configuration of the data communication unit used for the data telecommunication system concerning the gestalt 3 of operation of this invention.
[Drawing 5] The receiving timing chart of the input signal from the station for a communication link in a data communication unit and circumference base station of a gestalt 3 of operation.
[Drawing 6] The receiving timing chart of the input signal from the station for a communication link in the data communication unit used for the data telecommunication system concerning the gestalt 4 of operation of this invention, and a circumference base station.
[Drawing 7] The receiving timing chart of the input signal from the station for a communication link in the data communication unit used for the data telecommunication system concerning the gestalt 5 of operation of this invention, and a circumference base station.
[Drawing 8] The block diagram showing the configuration of the data communication unit used for the data telecommunication system concerning the gestalt 6 of operation of this invention.
[Drawing 9] The receiving timing chart of the input signal from the station for a communication link in a data communication unit and circumference base station of a gestalt 6 of operation.
[Drawing 10] The receiving timing chart of the input signal from the station for a communication link in a data communication unit and circumference base station of a gestalt 6 of operation.
[Drawing 11] The block diagram showing the configuration of the data communication unit used for the data telecommunication system concerning the gestalt 7 of operation of this invention.
[Drawing 12] The receiving timing chart of the input signal from the station for a communication link in a data communication unit and circumference base station of a gestalt 7 of operation.
[Drawing 13] The receiving timing chart of the input signal from the station for a communication link in a data communication unit and circumference base station of a gestalt 7 of operation.
[Drawing 14] The block diagram showing the configuration of the data communication unit used for the data telecommunication system concerning the gestalt 8 of operation of this invention.
[Drawing 15] The receiving timing chart of the input signal from the station for a communication link in a data communication unit and circumference base station of a gestalt 8 of operation.
[Drawing 16] The receiving timing chart of the input signal from the station for a communication link in a data communication unit and circumference base station of a gestalt 8 of operation.
[Drawing 17] The block diagram showing the configuration of the conventional data communication unit.
[Drawing 18] The receiving timing chart of the input signal from the conventional station for a communication link in a data communication unit and a conventional circumference base station.
[Description of Notations]
106 Recovery Section
109 Receiving Level Test Section
110 Control Data Detecting Element

117 Synthesizer Change Timing Control Section
118 User Data ON/OFF Judging Section
401 Level Judging Section

[Translation done.]